



REMARKS

Claims 1-8 and 10-15 are pending in the present Application. Applicant has amended claims 1 and 10. Consequently, claims 1-8 and 10-15 remain pending in the present Application.

Applicant has amended claim 1 to remove reference to the term "sequential" and to more clearly indicate that the data for the current position is processed before data for a subsequent position is processed. This allows the scene on the display to be processed and rendered to the display pixel by pixel, preferably in raster order, rather than object by object. Similarly, Applicant has amended claim 10 to more clearly recite that the interpolator, means for utilizing the mask to provide antialiasing and the processor block process the scene pixel by pixel in raster order. Support for the amendment to claims 1 and 10 can be found in the specification, page 13, line 16-page 14, line 6 and Figure 5 of the present application. Accordingly, Applicant respectfully submits that no new matter is added. Moreover, the step (e) of claim 1 had previously depended upon prior steps (d) and, therefore, (a)-(c). Consequently, Applicant respectfully submits that the amendments to claim 1 do not narrow the scope of claim 1.

In the above-identified Office Action, the Examiner rejected claims 1, 2 and 4 under 35 U.S.C. § 103 as being obvious in light of U.S. Patent No. 4,918,626 ("Watkins") in view of U.S. Patent No. 5,684,919 ("Foran"). The Examiner also rejected claims 3 and 5-8 under 35 U.S.C. § 103 as being unpatentable over Watkins in view of Foran in further view of U.S. Patent No. 5,872,902 ("Kuchkuda"). The Examiner also rejected claims 10-15 under 35 U.S.C. § 103 as being unpatentable over Watkins in view of Foran in further view of U.S. Patent No. 5,408,606 ("Eckart").

In the above-identified Office Action, the Examiner rejected claims 1, 2 and 4 under 35 U.S.C. § 103 as being obvious in light of Watkins in view of Foran. In response to Applicant's arguments, the Examiner stated that the term "sequential steps" in claim 1 was given no patentable weight. The Examiner also indicated that the rendering of the objects pixel by pixel was not recited in claims 1 and 10.

Independent claim 1 recites a method for generating a graphical image on a display from data describing at least one object. The display includes a plurality of positions, each of which has an area. The method recited in claim 1 includes several steps. It is determined in step (a) whether a portion of an object of the at least one object intersects a current position of the plurality of positions. An output is provided if the portion intersects the current position. If it is determined in step (a) that the portion of the object intersects the current position, then a mask for the portion is provided in step (b). The mask indicates an extent to which the portion occupies the area of the current position. The mask obtained in step (b) is used in step (c) to provide antialiasing for the portion of the object at the current position. Steps (a)-(c) are repeated for each remaining object of the at least one object in step (d). In step (e), steps (a) through (d) for each remaining position of the plurality of positions once step (d) has been performed for the current position.

Thus, the graphical image is rendered "position by position in raster order." In the embodiments described in the specification, each position in the display corresponds to a pixel. Thus, the method recited in claim 1 processes and renders the objects pixel by pixel, preferably in raster order. Only one pass through the data for the objects is thus required. Specification,

page 18, lines 5-6. Linked lists, therefore, need not be used and the memory and resources required for linked lists are freed. Specification, page 18, lines 6-10.

In contrast, Watkins in view of Foran fails to teach a method including the recited combination of steps. Watkins in view of Foran fails to teach or suggest determining whether objects intersect a current pixel (position), providing masks for objects intersecting a current pixel, antialiasing the objects intersecting the current pixel, then performing these steps for objects intersecting subsequent pixels. Watkins thus fails to teach or suggest the step (e) of processing data for subsequent positions after the data for all of the objects is processed in step (d).

In contrast to the method recited in claim 1, Watkins describes a system which renders objects polygon by polygon, rather than pixel by pixel. This can be seen in Fig. 6 of Watkins and the accompanying discussion. In particular, after converting the data for a portion of a polygon to pixel data, it is determined whether the polygon has been completely converted. Watkins, Fig. 3, item 76 and on col. 11, lines 6-13. If the polygon has not been completed, processing of the polygon continues. However, if the polygon has completed, then the prior steps used in rendering the polygon are repeated for a new polygon. Watkins, col. 11, lines 14-24. Thus, Watkins would process data for all of the pixels which intersect a current object, then processes pixels intersecting the next object. Therefore, Watkins would not perform step (e) of method 1, processing data for a subsequent position after data is processed for all of the objects intersecting the current position. Instead, Watkins would process all of the data for a current object before moving to the next object. Thus, Watkins cannot teach or suggest the method recited in claim 1.

The teachings of Foran fail to remedy the defect of Watkins. Applicant agrees that Foran discusses using masks to perform antialiasing. However, Applicant can find no mention in Foran of

rendering objects in raster order or pixel by pixel rather than object by object. In particular, Applicant can find no mention in Foran of processing data for objects intersecting another position after data for all of the objects intersecting the current position is processed, as recited in step (e). Consequently, Foran cannot remedy the defect of Watkins. Thus, any combination of Watkins in view of Foran must also render the scene object by object. Consequently, Watkins in view of Foran cannot teach or suggest the method of claim 1. Accordingly, Applicant respectfully submits that claim 1 is allowable over the cited references.

Claims 2 and 4 depend upon independent claim 1. Consequently, the arguments herein apply with full force to claims 2 and 4. Accordingly, Applicant respectfully submits that claims 2 and 4 are allowable over the cited references.

The Examiner also rejected claims 3 and 5-8 under 35 U.S.C. § 103 as being unpatentable over Watkins in view of Foran in further view of Kuchkuda.

Claims 3 and 5-8 depend upon independent claim 1. Consequently, the arguments herein with respect to Watkins and Foran apply with full force to claims 3 and 5-8. In particular, Watkins in view of Foran fails to teach or suggest processing data for a subsequent position after data is processed for all of the objects intersecting the current position, the result of which allows objects to be rendered pixel by pixel rather than object by object.

Kuchkuda fails to remedy the defects of Watkins in view of Foran. In particular, the cited portions of Kuchkuda fail to mention performing a method for antialiasing including the steps of determining intersections of objects with a current position, providing masks for the objects intersecting the current pixel and performing antialiasing for all the objects intersecting a current position before performing these steps for another position. Similarly, the cited portions of

Kuchkuda also fail to mention a system which renders objects in raster order. Consequently, any method or system made using the teachings of Watkins in view of Foran in further view of Kuchkuda would fail to mention performing a method for antialiasing including determining intersections of objects with a current position, providing masks for the objects intersecting the current position and performing antialiasing for all the objects intersecting the current position before performing these steps for another position. Thus, Watkins in view of Foran in further view of Kuchkuda cannot teach or suggest step (e) of claim 1. Accordingly, Applicant respectfully submits that claims 3, 5-8 and 12-15 are allowable over the cited references.

The Examiner also rejected claims 10-15 under 35 U.S.C. § 103 as being unpatentable over Watkins in view of Foran in further view of Eckart. Claim 10 recites the use of a display, a processor block an interpolator and means for utilizing masks provided by the interpolator to perform antialiasing ("antialiasing means"). The display includes a plurality of positions, each of the which has an area. The processor block determines if a portion of each of the at least one object intersects a current position of the plurality of positions and provides an output if the portion intersects the current position. The processor block provides the output for all object(s) intersecting the current position before providing an output for any object intersecting a subsequent position. The interpolator interpolates the data and providing a mask for the portion. The antialiasing means use the mask to perform antialiasing. The object is rendered by the interpolator and the mask utilizing means position by position in raster order.

Watkins and Foran fail to teach or suggest a system in which the processor block provides the output for all object(s) intersecting the current position before providing an output for any object

intersecting a subsequent position. Watkins and Foran also fail to teach or suggest a system in which the interpolator and antialiasing means render the frame position by position in raster order.

As discussed above, Watkins converts objects to image data object by object. Consequently, the recited processor block, interpolator and antialiasing means are neither taught nor suggest by Watkins. Similarly, as discussed above, although Foran mentions the use of masks in antialiasing, Applicant has found no mention in Foran of a processor block that outputs all of the data for objects intersecting the current position before providing data for objects intersecting subsequent position. Similarly, Applicant has found no mention in Foran of an interpolator and antialiasing means rendering data position by position in raster order.

Eckart fails to remedy the defect of Watkins and Foran. Eckart describes a system including processors PP_1 - PP_N , a cross bar, blending processors BP_1 - BP_M and a frame buffer. Eckart states that the display receives the data pixel by pixel in raster order. Eckart, col. 4, lines 65-67. However, This is due to the presence of frame buffer. Eckart, col. 4, lines 64-65. The data from the processor PP_1 - PP_N of Eckart is organized based on primitives. Eckart, col. 6, lines 27-30. The processors PP_1 - PP_N of Eckart correspond to the processor block of claim 1 because these processors of Eckart provide an output for specific pixels which the object, or primitive, intersects. There is no indication that the processors of Eckart provide the data in any particular order. As stated above, Eckart merely indicates that the flow of data is organized based upon the objects The crossbar of Eckart ensures that the data flows from the processors to appropriate blending processor, which are organized based on position in the screen (i.e. based on position). Eckart, col. 6, lines 33-36. This is in contrast to the recited processor block, which outputs all of the data for objects intersecting the current position before providing data for objects intersecting subsequent position.

Furthermore, although the blending processors are organized based upon the positions of pixels in the screen, there is no indication that the blending processors of Eckart process the data for different positions in the display in any particular order. Instead, the data are apparently provided from the blending processors to the frame buffer in an undefined order. It is when the data are provided from the frame buffer to the display that the data are placed in raster order. Eckart, col. 9, lines 20-26. This is contrast to the interpolator and antialiasing means of claim 10, which render data position by position in raster order. Eckart, therefore, does not remedy the defects of Watkins and Foran. Watkins in view of Foran in further view of Eckart cannot, therefore, teach or suggest the system recited in claim 10. Accordingly, Applicant respectfully submits that claim 10 is allowable over the cited references.

Claims 11-15 depend upon independent claim 10. Consequently, the arguments herein apply with full force to claims 11-15. Accordingly, Applicant respectfully submits that claims 11-15 are allowable over the cited references.

Accordingly, for the above-mentioned reasons, Applicant respectfully submits that the claims are allowable over the cited reference. Consequently, Applicant respectfully requests reconsideration and allowance of the claims as currently presented.

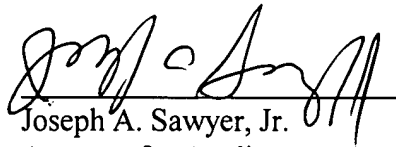
Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned “**Version with markings to show changes made**”.

Applicant's attorney believes that this application is in condition for allowance. Should any unresolved issue remain, the Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,

March 19, 2001

Date

A handwritten signature in black ink, appearing to read "Joseph A. Sawyer, Jr.", written over a horizontal line.

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

1. (Amended) A method for generating a graphical image on a display from data describing at least one object, the display including a plurality of positions, each of the plurality of positions having an area, the method comprising the [sequential] steps of:

(a) determining if a portion of an object of the at least one object intersects a current position of the plurality of positions and providing an output if the portion intersects the current position;

(b) providing a mask for the portion if it is determined that the portion intersects the current position, the mask indicating an extent to which the [one] portion occupies the area of the current position;

(c) using the mask to provide antialiasing for the portion at the current position;

(d) repeating steps (a)-(c) for each remaining object of the at least one object at the current position; and

(e) repeating steps (a) through (d) for each remaining position of the plurality of positions once step (d) is performed for the current position;

thereby allowing the graphical image to be rendered position by position.

10. (Amended) A system for generating a graphical image on a display from data describing at least one object, the system comprising:

a display including a plurality of positions, each of the plurality of positions having an area;

a processor block coupled with the display, the processor block for determining if a portion of each of the at least one object intersects a current position of the plurality of positions and providing an output if the portion intersects the current position;

an interpolator coupled with the processor block, the interpolator for interpolating the data and providing a mask for the portion, the mask indicating an extent to which the portion occupies the area of the current position; and

means for utilizing the mask to provide antialiasing;

wherein the at least one object are rendered by the interpolator and the mask utilizing means position by position in raster order; and

wherein the processor block provides the output for all of the at least one object intersecting the current position before providing an output for any of the at least one object intersecting a subsequent position.